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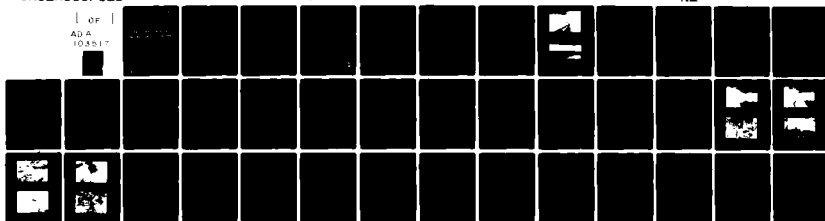
ARMY ENGINEER DISTRICT NORFOLK VA  
NATIONAL DAM SAFETY PROGRAM, LAKELAND DAM (INVENTORY NUMBER VA --ETC(U)  
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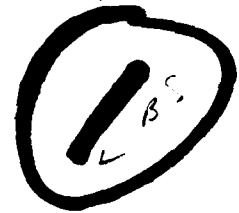


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# JAMES RIVER BASIN.

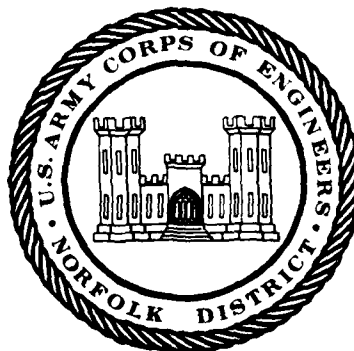
AD A103517

LEVEL II



Name Of Dam: LAKELAND  
Location: CAMPBELL COUNTY.  
Inventory Number: VA 03111

## PHASE I INSPECTION REPORT NATIONAL DAM SAFTY PROGRAM



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NORFOLK DISTRICT CORPS OF ENGINEERS  
803 FRONT STREET  
NORFOLK, VIRGINIA 23510

NOVEMBER 1980

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## 20. Abstract

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I Inspection is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspection. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

Phase I reports include project information of the dam appurtenances, all existing engineering data, operational procedures, hydraulic/hydrologic data of the watershed, dam stability, visual inspection report and an assessment including required remedial measures.

JAMES RIVER BASIN

NAME OF DAM: LAKELAND  
LOCATION: CAMPBELL COUNTY, VIRGINIA  
INVENTORY NUMBER: VA 03111

PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM

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NORFOLK, VIRGINIA 23510

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## TABLE OF CONTENTS

Preface . . . . .	i
Brief Assessment of Dam . . . . .	ii
Overview of Dam	
Section 1: PROJECT INFORMATION . . . . .	1-1
Section 2: ENGINEERING DATA . . . . .	2-1
Section 3: VISUAL INSPECTION . . . . .	3-1
Section 4: OPERATIONAL PROCEDURES . . . . .	4-1
Section 5: HYDRAULIC/HYDROLOGIC DATA . . . . .	5-1
Section 6: DAM STABILITY . . . . .	6-1
Section 7: ASSESSMENT/REMEDIAL MEASURES . . . . .	7-1
Appendix I: Maps and Drawings	
Appendix II: Photographs	
Appendix III: Field Observations	
Appendix IV: References	

## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of the Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the design flood should not be interpreted as necessarily posing a highly inadequate condition. The design flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT  
NATIONAL DAM SAFETY PROGRAM

BRIEF ASSESSMENT OF DAM

Name of Dam: Lakeland  
State: Virginia  
Location: Campbell County  
USCS Quad Sheet: City Farm  
Stream: Tributary of Dreaming Creek  
Date of Inspection: 8 October 1980

The Lakeland Dam is an earthfill structure approximately 550 feet long and 26.6 feet high. The dam is owned and maintained by the Lakeland Homeowners Association. The dam is classified as a small dam with a significant hazard classification. The principal spillway is an 18-inch corrugated metal pipe drop-inlet that passes at low level through the dam. The emergency spillway is an open channel earthen spillway located at the right abutment. The reservoir is used for recreation.

Based on criteria established by the Department of the Army, Office of the Chief of Engineers (OCE), the Spillway Design Flood (SDF) is the 1/2 PMF. The emergency spillway will pass the SDF without overtopping the dam. Therefore, the emergency spillway is adjudged as adequate.

The visual inspection revealed no apparent problems and there are no immediate needs for remedial measures. Maintenance is performed by the owners. However, there is no regular maintenance operations plan or warning system. It is recommended that the services of a qualified geotechnical engineering firm be engaged to perform a stability check of the dam. This should be completed within 12 months. It is also recommended that a regular maintenance and operations program be instituted with provisions for accurate records of all maintenance performed, and that a warning system be established. The maintenance items listed in Section 7.2 should be accomplished as part of the regular maintenance program within the next 12 months.

Submitted By:

Approved:

Original signed by  
JAMES A. WALSH

Original signed by:  
Douglas L. Haller

JAMES A. WALSH, P. E.  
Chief, Design Branch

DOUGLAS L. HALLER  
Colonel Corps of Engineers  
District Engineer

Recommended By

Date: JAN 8 1981

Original signed by  
JACK G. STARR

JACK G. STARR  
Chief, Engineering Division





CREST



RESERVOIR AREA

# OVERALL VIEW LAKELAND DAM

8 OCTOBER 1980

## SECTION 1

### PROJECT INFORMATION

#### 1.1 GENERAL:

1.1.1 Authority: Public Law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers to initiate a national program of safety inspections of dams throughout the United States. The Norfolk District has been assigned the responsibility of supervising the inspection of dams in the Commonwealth of Virginia.

1.1.2 Purpose of Inspection: The purpose is to conduct a Phase I inspection according to the Recommended Guidelines for Safety Inspection of Dams (Reference 1, Appendix IV). The main responsibility is to expeditiously identify those dams which may be a potential hazard to human life or property.

#### 1.2 Project Description:

1.2.1 Dam and Appurtenances: Lakeland Dam is an earth embankment about 550 feet long and 26.6 feet high. The top of the dam is 12 feet wide with an average elevation of 859.5 feet m.s.l. The upstream/downstream slopes are approximately 1 vertical to 2.25 horizontal (1V:2.25H).

It is unknown if the dam is keyed into the foundation or whether or not there is a drainage system. There are no foundation drain outlets. There is no riprap on the dam.

The principal spillway consists of an 18-inch corrugated metal pipe (CMP) that serves as a drop-inlet at elevation 854.0. A steel oil drum, cut in half with steel bars welded between the CMP and the oil drum, serves as a trash rack to prevent debris from entering the intake. The pipe passes through the dam at low level and discharges through an 18-inch CMP outlet at elevation 833.7.

The emergency spillway is an open channel, trapezoid shaped spillway cut through natural ground located at the right abutment. The crest of the spillway is at elevation 856.0. The spillway is about 80 feet wide at the crest elevation of the dam.

There is no outlet available to drain the reservoir.

1.2.2 Location: Lakeland Dam is located on a tributary of Dreaming Creek about 2 miles southwest of Lynchburg, Virginia. (Reference Plate 1, Location Plan)

1.2.3 Size Classification: The dam is classified as a "small" size structure as defined by Reference 1 of Appendix IV.

1.2.4 Hazard Classification: The dam is located in a residential neighborhood with two homes about 1/4 mile downstream of the Lakeland Dam. Therefore, a "significant" hazard classification is given in accordance with guidelines contained in Section 2.1.2 of Reference 1, Appendix IV. The hazard classification used to categorize dams is a function of location only and has nothing to do with its stability or probability of failure.

1.2.5 Ownership: Lakeland Homeowners Association.

1.2.6 Purpose: Recreation.

1.2.7 Design and Construction History: There is no known design and construction history.

1.2.8 Normal Operational Procedures: Water flows automatically through the principal spillway when the water level in the reservoir rises above elevation 854.0. Water will also flow automatically through the emergency spillway when the reservoir reaches elevation 856.0.

### 1.3 Pertinent Data:

1.3.1 Drainage Area: The dam controls a drainage area of 0.28 square miles.

#### 1.3.2 Discharge at Dam Site:

Maximum flow .....unknown

Emergency Spillway

Pool level at top of dam....1414 cfs

1.3.3 Dam and Reservoir Data: Pertinent data on the dam and reservoir are shown in the following table:

TABLE 1.1 DAM AND RESERVOIR DATA

Item	Elevation feet msl	Reservoir			
		Area, acres	Capacity		Length feet
			Acre, feet	Watershed, inches 1/	
Crest of Dam	859.5	16.0	150	10.0	1600
Emergency Spillway					
Crest	856	9.4	95	6.4	1300
Principal Spillway					
Crest	854	8.3	83	5.6	1100
Streambed at Down- stream Toe of Dam	832.9	--	--	--	--

## SECTION 2

### ENGINEERING DATA

- 2.1 Design: There is no known design information.
- 2.2 Construction: There are no known construction records.
- 2.3 Evaluation: There is insufficient information to evaluate foundation conditions and embankment stability.

## SECTION 3

### VISUAL INSPECTION

#### 3.1 Findings:

3.1.1 General: The results of the 8 October 1980 inspection are recorded in Appendix III. At the time of the inspection, the weather was sunny and clear. The temperature was 45-55°F. and the ground conditions were dry. The pool elevation was about 854 feet msl, normal pool elevation, and the tailwater was at approximately 833 feet msl. There was flow through the principal spillway. There are no known prior inspection reports.

3.1.2 Embankment: The embankment is in good condition. A sketch showing a plan view and cross section is provided on Plate II, Appendix I. An overall view of the crest is provided at the beginning of the report.

There are no signs of surface cracks, unusual movement or misalignment. However, there are two animal burrows located on the upstream face of the dam (See Plate II, Appendix I) at station 4+50 and 5+00. The burrow at station 4+50 is about 8 inches in diameter and over 4 feet deep. There is a local sloughing of material around the burrow. The burrow at station 5+00 is much smaller. Two motorcycle trails run up the upstream right abutment, cross the crest and continue up the left abutment. A foot path runs along the waterline on the upstream face and several footpaths run down the downstream face from the crest to the toe.

Water is seeping from the area in the immediate vicinity of the principal spillway outlet pipe. Flow is clear, and the rate was not measured.

A second seep is located on the downstream left abutment at elevation 845.3. Flow is clear and has eroded a channel approximately 6-inches deep and 18-inches wide down the abutment contact. Where the flow intersects the toe, a section of 24-inch concrete pipe is standing vertically. Water is standing in the pipe at a level approximately 0.1 feet higher than the water surrounding the pipe. Rate of flow of the seep was measured approximately 20 feet downstream of the toe and was 2.4 gpm (See Photos. No. 6, 7, and 8, Appendix II).

The downstream toe is wet from a point 114 feet right of the principal spillway outlet to the left abutment. The wet area extends about 3 feet up the face of the dam and out away from the dam approximately 10 feet.

The upstream face and the crest of the dam are well vegetated with grass (See Photo. No. 1). Several small shrubs dot the upstream face. The downstream face is heavily vegetated with large trees, hardwoods and pines, ranging in diameter from 2 to 8 inches. Several fallen trees and miscellaneous debris litter the downstream face (See Photos. No. 2 and 3, Appendix II).

Area soils are low plastic silty clays with some fine to medium sand.

Six four-inch wooden posts are located on the crest of the dam about station 3+60 to deter motorcycle traffic.

3.1.3 Outlet Works: The 18-inch CMP drop inlet appears in good shape. (See Photo. 4, Appendix II). An oil drum with steel bars attached, functions as a trash rack. The drum is rusty and will need replacing in the future. The outlet pipe is shown in Photo. 3, Appendix II.

3.1.4 Emergency Spillway: The emergency spillway is a cut in natural ground just right of the dam. Both the approach channel and the control section are well vegetated with grass. The discharge channel is well vegetated with small trees and shrubs. Several fallen trees also block portion of the emergency spillway.

3.1.5 Instrumentation: There is no instrumentation on the dam.

3.1.6 Reservoir Area: The reservoir area is one-half heavily wooded with moderately steep slopes and one-half cleared with very mild slopes. There are no signs of shoreline erosion or reservoir slope failures. The inspection team was unable to evaluate reservoir sedimentation. An overall view of the reservoir area is provided at the beginning of the report.

3.1.7 Downstream Channel: The downstream channel slopes are moderate with thick growth of trees for at least 1,000 yards downstream of the dam's crest. The area is heavily vegetated with trees, shrubs and vines. Two homes are located about 1/4 mile downstream.

3.2 Evaluation: Overall the dam appears in good condition. The visual inspection revealed certain preventive maintenance items which should be scheduled as part of an annual maintenance program. These are:

a. The animal burrows should be filled with compacted material, the surrounding area dressed and seeded.

b. The motorcycle trails should be dressed and seeded. Further motorcycle traffic should be halted.

c. The footpath on the upstream face of the dam should be seeded.

d. The footpaths on the downstream face of the dam should be regraded and seeded.

e. The wet area on the downstream toe and the seeps in the vicinity of the principal spillway outlet pipe and on the downstream left abutment should be monitored for an increase in flow during periodic inspections.

f. The eroded channel on the downstream left abutment should be paved with concrete or asphalt or lined with half pipe section to prevent further erosion and inspected during periodic inspections.

- g. The shrubs on the upstream face should be cut at their roots.
- h. The trees on the downstream face should be cut off at their roots. However, any trees with diameters larger than 3 inches should have their root system removed. Subsequent holes should be backfilled with compacted material and seeded. The fallen trees and miscellaneous debris should be removed.
- i. The shrubs and trees in the discharge channel of the emergency spillway should be cut off at ground level. The fallen trees should be removed.
- j. A staff gage should be installed in the reservoir to extend above the crest of the dam.
- k. The trees and shrubs along the toe of the dam should be cut off at ground level annually as a part of the maintenance program to provide access to monitor the seeps and the wet areas in the downstream area.

## SECTION 4

### OPERATIONAL PROCEDURES

4.1 Procedures: The normal storage pool is elevation 854, which is the crest of the principal spillway. The reservoir provides recreation for area residents. Water passes automatically through the principal spillway as the water level rises above the principal spillway crest (elevation 854.0). Water will also pass automatically through the emergency spillway when the water in the reservoir rises above elevation 856.0. There is no outlet to drain the reservoir.

4.2 Maintenance: The Lakeland Homeowners Association has the grass mowed on the crest and upstream face.

4.3 Warning System: At the present time, there is no warning system or emergency operations plan for Lakeland Dam.

4.4 Evaluation: The dam does not require an elaborate operational and maintenance procedure. However, the regular maintenance program should be expanded to include vegetation removal on the embankment and documentation of all work. An emergency operation and warning plan should be developed. It is recommended that a formal emergency procedure be prepared and furnished to all operating personnel. This should include:

- a. How to operate the dam during an emergency.
- b. Who to notify, including public officials, in case evacuation from the downstream area is necessary.



## SECTION 5

### HYDRAULIC/HYDROLOGIC DATA

5.1 Design: None were available.

5.2 Hydrologic Records: None were available.

5.3 Flood Experience: The maximum flood at the dam site is not known.

5.4 Flood Potential: The 100 Year Flood, 1/2 PMF, and PMF were developed and routed through the reservoir by use of the HEC-1DB computer program (Reference 2, Appendix IV) and appropriate unit hydrograph, precipitation and storage-outflow data. Clark's Tc and R coefficients for the local drainage area were estimated from basin characteristics. The rainfall applied to the developed unit hydrograph was obtained from U. S. Weather Bureau Publications (References 3 and 4, Appendix IV).

5.5 Reservoir Regulation: Pertinent dam and reservoir data are shown in Table 1.1.

Water passes automatically through the principal and emergency spillways as the reservoir rises above the spillways crests.

The storage curve was developed based on areas obtained from a U. S. Geological Survey Quadrangle Map. Survey data taken during the inspection was correlated to the City Farm, Virginia Quadrangle Map to help develop the area-storage data. Rating curves for the nonoverflow section and emergency spillway were developed. In routing hydrographs through the reservoir, it was assumed that the initial pool level was at the principal spillway crest (elevation 854.0). Flow through the principal spillway was neglected during all routings.

5.6 Overtopping Potential: The probable rise in the reservoir and other pertinent information on reservoir performance is shown in the following table:

Table 5.1 RESERVOIR PERFORMANCE

	Normal	100 <u>1/</u>	1/2 PMF	PMF 2/
Item	Flow	Year		
Peak flow c.f.s.				
Inflow	1	565	1511	3022
Outflow	1	198	1231	2829
Maximum elevation				
ft. msl	854.0	856.8	859.2	860.3
Non-overflow section (el 859.5)				
Depth of flow, ft		-	-	0.8
Duration, hrs		-	-	1.0
Velocity, fps 3/		-	-	3.8
Tailwater elevation	833.4+	-	-	-

1/ The 100 Year Flood has one chance in 100 of occurring in any given year.

2/ The PMF is an estimate of flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region.

3/ Critical Velocity

5.7 Reservoir Emptying Potential: The is no outlet to drain the lake.

5.8 Evaluation: Based on the size (small) and hazard classification (significant) the recommended Spillway Design Flood is the 100 Year Flood to the 1/2 PMF. Because of the risk involved, the 1/2 PMF has been selected as the SDF. The emergency spillway will pass 62 percent of the PMF or 100 percent of the SDF without overtopping the dam.

Conclusions pertain to present day conditions. The effect of future development on the hydrology has not been considered.

## SECTION 6

### DAM STABILITY

6.1 Foundation and Abutments: There is no information available on the foundation conditions. The dam is located within the Piedmont physiographic province of Virginia. The Lynchburg Formation outcrops in the vicinity of the dam and is characterized by gray biolite-quartz gneiss, quartz-mica schist. As noted in the visual inspection, the downstream toe is wet and there is a seep in the vicinity of the principal spillway outlet pipe and on the downstream left abutment. It is unknown if the dam is keyed into the foundation or if there are any foundation drains. There are no foundation drain outlets. The predominate foundation materials are relatively impervious, stable, fine grained alluvial soils. The wet spots are probably due to the lack of toe drainage system and should be expected under these conditions.

#### 6.2 Embankments:

6.2.1 Materials: There is no information available on the nature of the materials. The area soils are low plastic silty clays with some fine to medium sand.

6.2.2 Stability: There are no available stability calculations. The dam is 26.6 feet high and 12 feet wide. The slopes are 2.25H:1V. The dam is not subject to sudden drawdown because there is no provision for draining the reservoir. It is unknown if the dam has ever experienced the maximum control storage pool which is at the elevation of the emergency spillway (2 feet above normal pool).

According to the guidelines presented in Design of Small Dams, U. S. Department of the Interior, Bureau of Reclamation for small homogenous dams, with a stable foundation, not subject to a sudden drawdown and composed of a low plastic fines (CL, ML), the recommended slopes are 3.0H:1V upstream and 2.5H:1V downstream. The recommended width is 16 feet. Based on these guidelines, the dam has inadequate slopes and width.

6.2.3 Seismic Stability: The dam is located in Seismic Zone 2. Therefore, according to the Recommended Guidelines for Safety Inspection of Dams, the dam is considered to have no hazard from earthquakes provided static stability conditions are satisfactory and conventional safety margins exist.

6.3 Evaluation: There is insufficient information to adequately evaluate the stability of the dam. Overtopping is not a problem because the spillways will pass the design flood. It is recommended that the service of a qualified geotechnical engineering firm be engaged to perform a stability check on the dam because of the lack of design data and construction history, and the inadequate slopes and width. This should be completed within 12 months.

## SECTION 7

### ASSESSMENT/REMEDIAL MEASURES

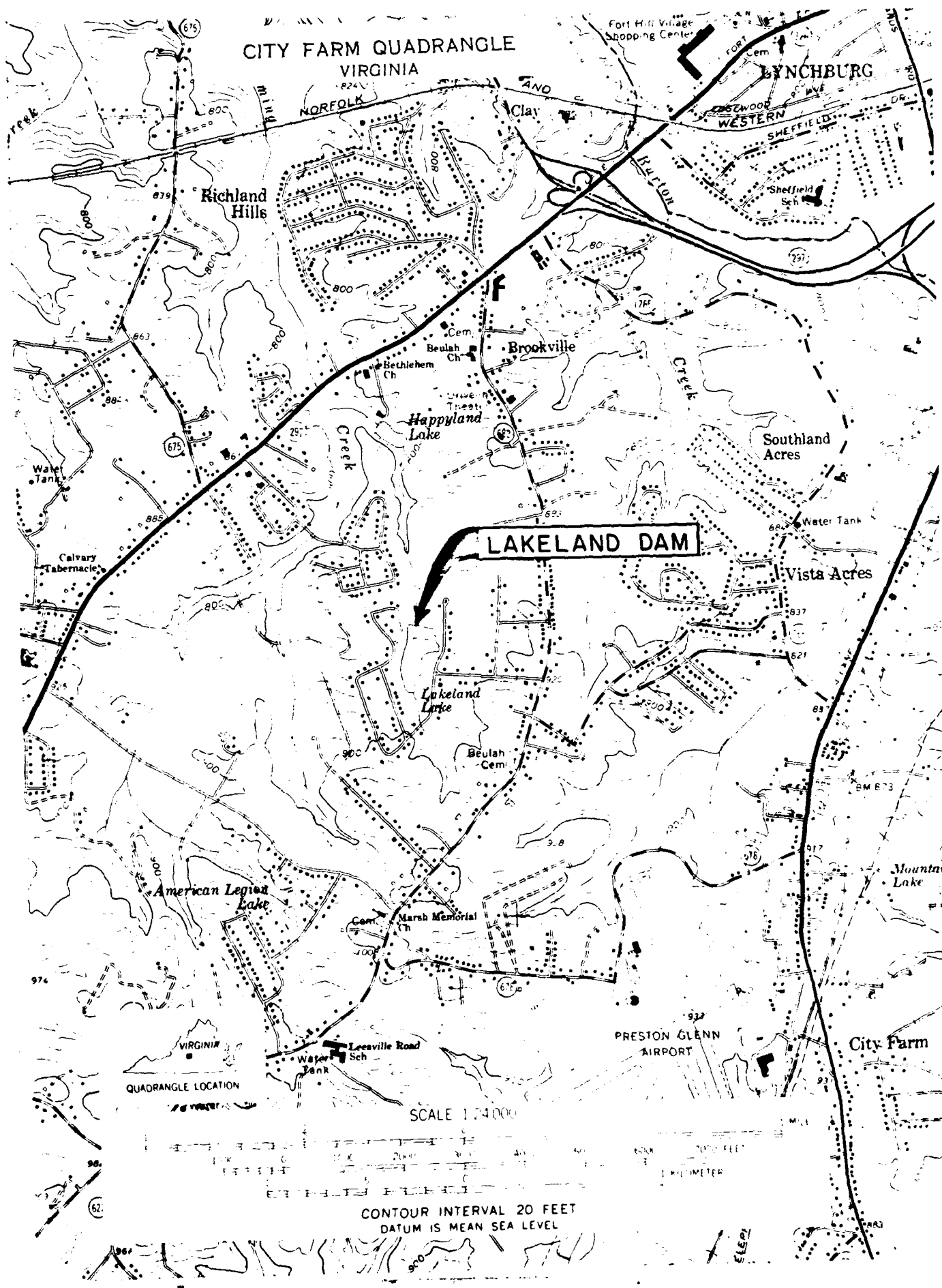
7.1 Dam Assessment: The available engineering data is insufficient to evaluate the embankment stability. The visual inspection revealed no findings that proved the dam to be unsound. There is a limited maintenance program. However, there is no inspection program or emergency operations and warning plan. Based on criteria established by the Department of the Army, Office of the Chief of Engineers (OCE), the Spillway Design Flood (SDF) is the 1/2 PMF. The spillways will pass 62 percent of the PMF or 100 percent of the SDF without overtopping the dam; therefore, the spillways are considered adequate. Overall the dam is in good condition and there is no immediate need for remedial measures. However, a stability check is required due to the inadequate slopes and crest width, and the lack of design data and construction history.

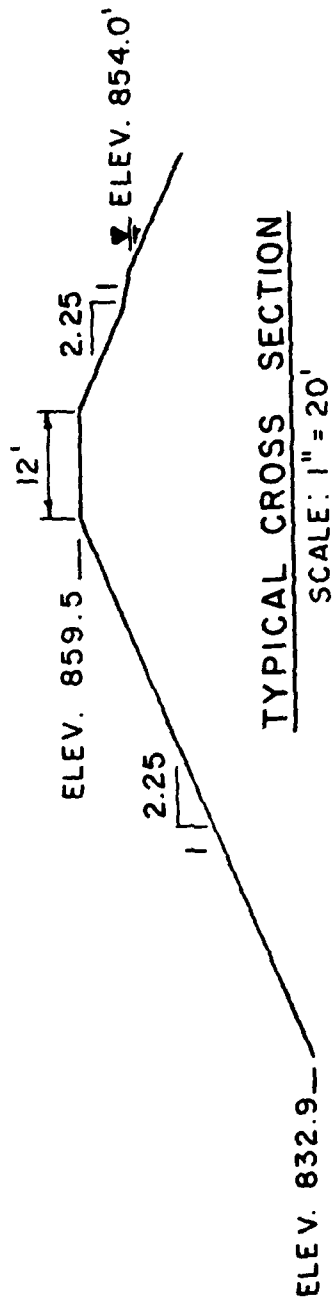
7.2 Recommended Remedial Measures: It is recommended that the services of a qualified geotechnical engineering firm be engaged to perform a stability check of the dam. This should be completed within 12 months. A regular maintenance and inspection program should be initiated to help detect and control problems as they occur. A formal emergency procedure should be prepared, including how to operate the dam in an emergency and who to notify, including public officials, in case evacuation from the downstream area is necessary. Also, the inspection revealed the following maintenance items that should be scheduled by the owner during a regular maintenance period within the next 12 months:

- a. The animal burrows should be filled with compacted material, the surrounding area dressed and seeded.
- b. The motorcycle trails on the crest of the dam should be dressed and seeded. Further motorcycle traffic should be halted.
- c. The footpath on the upstream face of the dam should be seeded.
- d. The footpaths on the downstream face of the dam should be regraded and seeded.
- e. The wet area on the downstream toe and the seeps in the vicinity of the principal spillway outlet pipe and on the downstream left abutment should be monitored for an increase in flow during periodic inspections.
- f. The eroded channel on the downstream left abutment should be paved with concrete or asphalt or lined with half pipe section to prevent further erosion and inspected during periodic inspections.

- g. The shrubs on the upstream face should be cut at their roots.
- h. The trees on the downstream face should be cut off at their roots. However, any trees with diameters larger than 3 inches should have their root system removed. Subsequent holes should be backfilled with compacted material and seeded. The fallen trees and miscellaneous debris should be removed.
- i. The shrubs and trees in the discharge channel of the emergency spillway should be cut off at ground level. The fallen trees should be removed.
- j. A staff gage should be installed in the reservoir to extend above the crest of the dam.
- k. The trees and shrubs along the toe of the dam should be cut off at ground level annually as a part of the maintenance program to provide access to monitor the seeps and the wet areas in the downstream area.

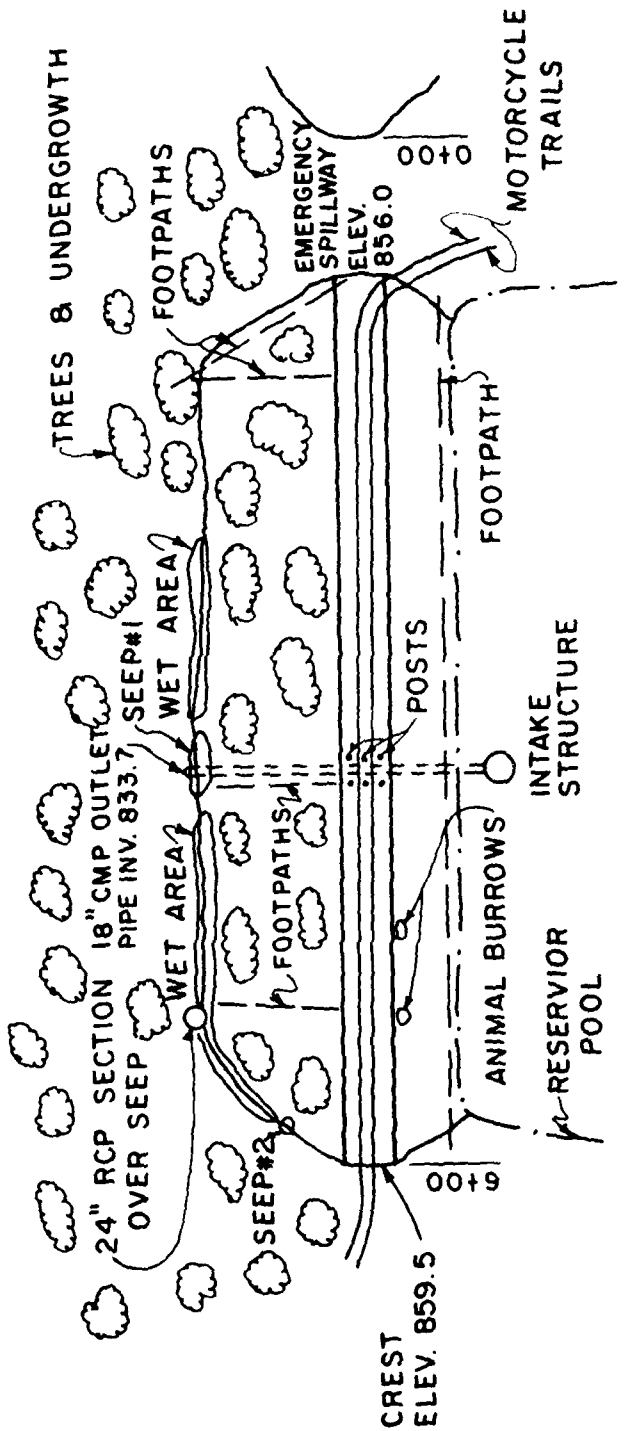
APPENDIX I  
MAPS AND DRAWINGS





TYPICAL CROSS SECTION

SCALE: 1" = 20'



PLAN VIEW OF THE DAM

NOT TO SCALE

NOTES:

1. SKETCH MADE FROM FIELD NOTES.
2. ELEVATIONS BASED ON TBM OF  
WATERSURFACE = 854.0 FEET. TAKEN  
FROM U.S.G.S. QUADRANGLE - CITY FARM, VA.

LAKELAND DAM  
CABELL COUNTY  
8 OCTOBER 1980  
PLATE II



APPENDIX II

PHOTOGRAPHS



PHOTO # 1 UPSTREAM FACE



PHOTO # 2 DOWNSTREAM FACE



PHOTO # 3 CREST



PHOTO # 4 INTAKE STRUCTURE



PHOTO #5 OUTLET



PHOTO #6 24-INCH UPRIGHT CONC PIPE  
BEYOND TOE OF DAM

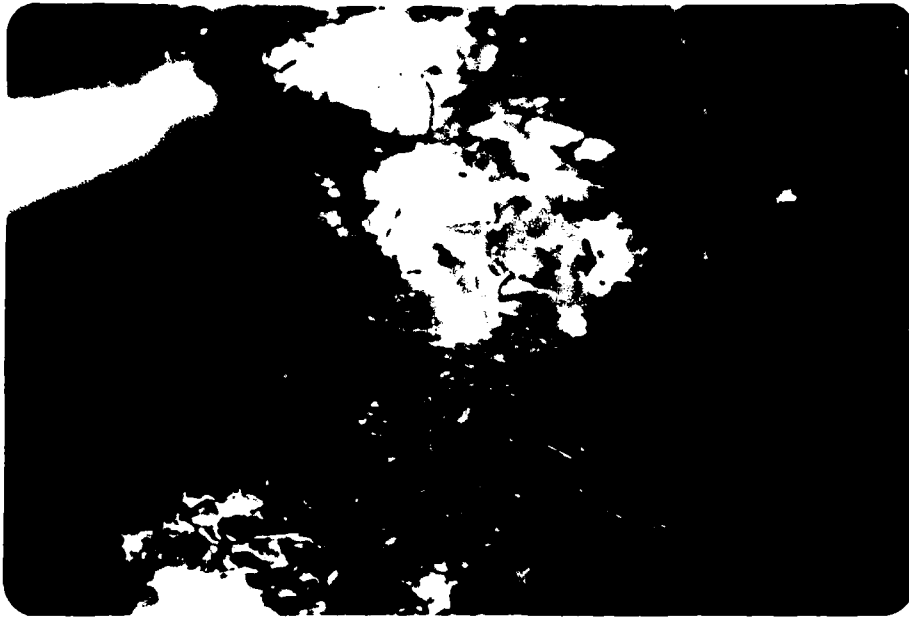


PHOTO #7 SEEP BELOW TOE OF DAM



PHOTO #8 SEEP BELOW TOE OF DAM

APPENDIX III  
FIELD OBSERVATIONS

Check List  
Visual Inspection  
Phase I

Name Dam: Lakeland      City: Lynchburg      State: Virginia      Coordinates:  
Lat 37° 20.8' North  
Long 79° 12.9' West

Date of Inspection: 8 Oct 80      Weather: Sunny, Clear,      Temperature: 45-55° F.  
Cool

Pool Elevation at Time of Inspection:      Tailwater at Time of Inspection: 833 ft. msl +

854 ft. msl +

Inspection Personnel:  
B. Taran, COE      D. Davis, COE  
J. Robinson, COE      D. Bushman, SWCB  
L. Jones, COE      H. Gildea, SWCB

Davis & Robinson      /      Recorders

# EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	There are no surface cracks. Ground conditions are dry.	None
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	There are no creep, sloughing, or bearing capacity problems.	None
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Two motorcycle trails run up the upstream right abutment, cross the crest of the dam and continue up the left abutment. A large animal burrow is located on the upstream face just below the crest at station 4+50. The burrow is about 8 inches in diameter and extends into the dam beyond a depth of 4 feet. There is a local sloughing material around the burrow. A second smaller burrow is also located on the upstream face just below the crest at station 5+00. A foot path runs along the waterline on the upstream face. A foot path runs down the downstream right abutment. Several foot paths run down the downstream face of the dam, they are located at station 1+30, 3+60, and 5+00.	The motorcycle trails should be dressed and seeded. Further motorcycle traffic on the embankment should cease. The animal burrows and the surrounding area should be dressed, backfilled with compacted material, and seeded. The footpaths should be regraded and seeded.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	The crest alignment is straight. There is no noticeable settlement. The conduit alignment appears straight. Six, four inch diameter wooden post are located on the crest about station 3+60 to deter motorcycle traffic.	None



# EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
RIPRAP FAILURES	There is no riprap on the dam	None
FOUNDATION	There is no noticeable sliding or settlement. The foundation material is generally impervious and appears stable. There are no known foundation drains.	None
ANY NOTICEABLE SEEPAGE	<p>A seep designated #1 (See Plate 2, Appendix I) is located in the area 10 feet on either side of the principal spillway outlet pipe. Water flow is clear, rate not measured. Seep #2 is located on the downstream left abutment at elevation 845.3' (See Plate 2, Appendix I).*</p> <p>Flow is clear and has eroded a channel approximately 6 inches deep by 18 inches wide into the left abutment. Where the flow intersects the toe a section of 24-inch concrete pipe is standing vertically, apparently an attempt to isolate a seep. Water is standing in the pipe at an elevation of about 0.1 feet higher than the water surrounding the pipe. Flow rate was measured 20 feet downstream of the pipe. Flow is 2.4 gpm. The downstream toe is wet from both seeps to a point 114 feet right of the outlet pipe at elevation 842.0'.* The wet area extends up the face of the dam about 3 feet and out away from the toe approximately 10 feet.</p>	<p>The seeps and wet areas should be monitored for an increase in flow during periodic inspections. A paved channel or half sections of pipe should be provided to deter erosion from the flow from the seep on the left abutment.</p>

\*Datum = Watersurface @ Time of Inspection = 854.0 feet, taken from USGS Quadrangle CITY FARM, VA.

# EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
DRAINS	There are no known embankment drains.	None
MATERIALS	Area soils are low plastic silty clays with some fine to medium sand.	None
VEGETATION	<p>The upstream face of the dam is well vegetated with grass. Several shrubs are also located on the upstream face. The downstream face is heavily vegetated with large trees, hardwoods and pines, ranging in diameter from 2 to 8 inches. Several fallen trees and miscellaneous debris litter the downstream face.</p>	<p>The shrubs should be cut off at their roots. The trees should also be cut off at their roots. However, trees having a diameter larger than 3 inches should have their root systems removed. Subsequent holes should be backfilled with compacted material and seeded. The miscellaneous debris should be removed.</p>

# PRINCIPAL SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONTROL SECTIONS	A corrugated metal pipe (visually estimated 18-inch diameter) functions as a drop-inlet. A steel oil drum with steel bars acting as a trash rack and cover extend above the water elevation. The oil drum has rusted but still functions efficiently.	The rusty oil drum may need replacing in the future.
APPROACH CHANNEL	The reservoir is clean of debris.	There should not be much of a problem with debris clogging the intake.
DISCHARGE CHANNEL	The 18-inch CMP passes through the dam and discharges near the toe of the dam.	None
BRIDGE AND PIERS	N/A	
EMERGENCY GATE	N/A	
GATES AND OPERATION EQUIPMENT	N/A	

# EMERGENCY SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONTROL SECTIONS	The open channel trapezoid shaped spillway, cut through natural ground, is located in the right abutment. There is a good grass cover over the entire spillway.	None
APPROACH CHANNEL	The approach channel is well vegetated and free of obstructions.	None
DISCHARGE CHANNEL	The discharge channel is clogged with downed trees and shrubs.	The trees and shrubs should be removed to allow free-flow if the spillway is activated.
BRIDGE AND PIERS	N/A	
MISCELLANEOUS	N/A	

# INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATION
MONUMENTATION/SURVEYS	There are no known monument in the immediate area.	None
OBSERVATION WELLS	There are no observation wells.	None
WEIRS	There are no weirs.	None
PIEZOMETERS	There are no piezometers.	None
STAFFGAGES	There are no staffgages.	A staff gage should be installed in the reservoir to extend above the crest of the dam.

# RESERVOIR

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The reservoir area is one-half heavily wooded and moderately steep and half cleared and very mild in slope. The surrounding area appears in good condition. There are no signs of shoreline erosion or reservoir slope failure.	None
SEDIMENTATION	The inspection team was unable to evaluate the sediment.	None

# DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The downstream area is heavily vegetated. Trees, shrubs, and vines are thick in the immediate area.	Clearing of trees and shrubs should be accomplished along the toe annually as a part of the maintenance program to provide access to monitor the seeps and wet areas.
SLOPES	The slopes are gentle to moderate with thick growth of trees for at least 1000 yards down- stream of the dam's crest.	None
APPROXIMATE NO. OF HOMES AND POPULATION	Two homes are located about 1/4 mile downstream.	None

APPENDIX IV

REFERENCES



## APPENDIX IV

### REFERENCES

1. Recommended Guidelines for Safety Inspection of Dams, Office of the Chief of Engineers, Department of the Army, Washington, D. C.
2. HEC-1DB Flood Hydrograph Package, (Hydrologic Engineering Center, U. S. Army Corps of Engineers, September 1978.)
3. "Probable Maximum Precipitation Estimates, United States East of the 105th Meridian," Hydrometeorological Report No. 51, (U. S. Weather Bureau, June 1978).
4. "Rainfall Frequency Atlas of the United States", Technical Paper No. 40, (U.S. Weather Bureau, May 1961).
5. Bureau of Reclamation, U. S. Department of the Interior, Design of Small Dams, A Water Resources Technical Publication, Revised Reprint, 1977.

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